Development of Screening Recommendations for Dredged Sediment Bioaccumulation Testing

Dredging Innovations Group (DIG)

U.S. ARMY CORPS OF ENGINEERS

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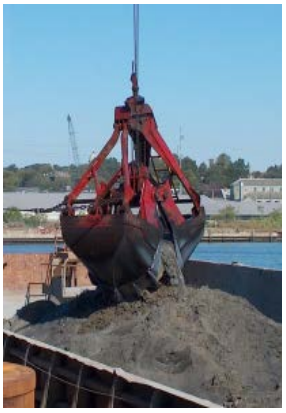
Problem

Environmental assessment of sediment to be dredged and placed into the aquatic environment frequently involves the use of bioaccumulation testing. Bioaccumulation testing, as it is applied in this context, is a laboratory test that determines the potential for aquatic organisms to take contaminants into their bodies from the sediments under consideration for placement. Bioaccumulation evaluation typically costs in excess of $100,000 per project, imposing a large financial burden on projects, especially those which are relatively small (e.g., 1,000-50,000 cubic yards). The regulatory testing and evaluation approach for bioaccumulation has remained essentially unchanged since the 1970s. Yet in the four decades over which testing has been conducted much as been learned about (1) sediment geochemistry and the role of various factors controlling contaminant bioavailability, (2) uptake and elimination kinetics, trophic transfer, biomagnification (an increase in contaminant concentration up the food web), and (3) the potential ecological and human health risks associated with food chain transfer of sediment associated contaminants. For example, it is now generally accepted that food chain biomagnification is only a concern for organic mercury and selenium and for a select suite of organic chemicals.

The lack of change to the testing approaches in response to this newer knowledge is rooted in specific regulatory language, agency interpretation, and outdated guidance. In contrast, new technical developments are being incorporated into other project assessments by the same agencies responsible for dredged material regulation. For example, programs which are responsible for assessing and remediating old industrial contaminated sediment sites, in particular the CERCLA Superfund program, are readily adopting the technical advances that have been made. A large part of this adoption for industrial site remediation projects is a less prescriptive regulatory approach for characterizing risk than what currently exists within the dredged sediment testing arena. However, another factor that may be involved in non-adoption by dredged material testing risk managers is that few studies have been conducted using the data specifically drawn from the bioaccumulation tests upon which regulators rely to make such decisions.



Study Description

The study we are conducting is intended demonstrate broadly applicable findings and trends by assembling and analyzing a large database of sediment and tissue testing data collected in the course of regulatory dredged sediment evaluations from USACE marine coastal and Great Lakes District projects. By specifically using data that has been collected for the regulatory process, our intent is that it will facilitate sensible reduction in the suite of contaminants that are selected in bioaccumulation testing.

Products

This study will produce a Technical Note, a Technical Report with proposed screening recommendations, a journal article, and a database of sediment test data assembled from a diverse cross section of projects from around the country.

Summary

The intended use of the screening approach will be to provide project managers at USACE Districts and USEPA regions a technical basis to choose which contaminants to analyze in tissues of organisms in bioaccumulation tests. Reduction of chemical analytical costs and other savings associated with these changes could reduce the costs borne by the Federal budget and by private applicants by several million dollars over a ten year period. For example, if only 10 projects per year, each with four bioaccumulation test sediments were able to avoid testing on a single contaminant group (e.g., PAHs) with a $600/sample cost, the 10 year savings would be about $3 million. Obviously, if the of test requirements on projects can achieve further reductions, the cumulative savings could be considerable.

Addressing complex dredging challenges and building institutional capacity for long-term mission sustainability.

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